

Claims

What is claimed is:

- [c1] A system for separating hydrocarbons from a material, comprising:
a process chamber;
a process pan adapted to be removably inserted into the process chamber;
a blower operatively connected to an inlet and outlet of the process chamber and to a heat source, the blower adapted to force air heated by the heat source into the process chamber through the material disposed on the process pan, the forced heated air adapted to vaporize hydrocarbons and other contaminants disposed on the material; and
a first condenser operatively connected to an outlet of the process chamber and adapted to condense the vaporized hydrocarbons and other contaminants.
- [c2] The system of claim 1, wherein air is drawn from the process chamber outlet by low pressure created at a blower inlet.
- [c3] The system of claim 1, further comprising a hood disposed over the process chamber, the hood being movable between an open position and a closed position and adapted to permit removal and insertion of the process pan.
- [c4] The system of claim 1, further comprising a heat recovery unit operatively connected to the outlet of the process chamber and adapted to recover heat from air containing the vaporized hydrocarbons and other contaminants.
- [c5] The system of claim 1, further comprising at least one filter adapted to remove particulate matter from the heated air disposed between the outlet of the process chamber and an inlet of the first condenser.
- [c6] The system of claim 5, wherein the first condenser comprises:

cooling coils adapted to condense the volatilized hydrocarbons so as to form
liquefied hydrocarbons;
an oil/water separator coupled to a condenser outlet and adapted to separate the
liquid hydrocarbons; and
a condenser outlet adapted to convey liquefied hydrocarbons and contaminants to
the oil/water separator.

- [c7] The system of claim 6, further comprising:
a second condenser operatively connected to the first condenser; and
a blower disposed between the second condenser and the first condenser.
- [c8] The system of claim 1, further comprising a control valve operatively connected to
the first condenser, the control valve adapted to release excess pressure in the first
condenser through a thermal oxidizer.
- [c9] The system of claim 8, wherein the control valve comprises at least one selected
from the group consisting of a control meter, a pressure transducer, and a pressure
relief valve.
- [c10] The system of claim 1, further comprising a control valve operatively connected to
a sensor adapted to detect non-condensable gases, the control valve adapted to
release non-condensable gases through a thermal oxidizer.
- [c11] A method for separating hydrocarbons from a material, comprising:
passing a stream of heated air over the material to volatilize hydrocarbons
disposed thereon;
passing the stream of heated air containing the hydrocarbons through a first
condenser to form liquified hydrocarbons;
collecting the liquified hydrocarbons; and
recirculating the heated air.

- [c12] The method of claim 11, further comprising filtering the stream of air prior to passing the stream through a condenser.
- [c13] The method of claim 11, further comprising filtering the stream of air after passing the stream through a condenser.
- [c14] The method of claim 11, further comprising passing the stream of air through a second condenser.
- [c15] The method of claim 11, further comprising thermally oxidizing any non-condensable gases prior to re-circulating the stream of air.
- [c16] The method of claim 11, wherein a hydrocarbon content of a material is reduced to 0.1% or less after treating the material for a period of time.
- [c17] A system for separating hydrocarbons from a material, comprising:
a process chamber having an inlet and an outlet;
a process pan adapted to be removably inserted into the process chamber;
a heat source adapted to provide heated air;
the inlet and outlet of the process chamber having a sufficient pressure difference to force air heated by the heat source into the process chamber through the material disposed on the process pan, the forced heated air adapted to vaporize hydrocarbons and other contaminants disposed on the material;
and
a first condenser operatively connected to an outlet of the process chamber and adapted to condense the vaporized hydrocarbons and other contaminants.
- [c18] The system of claim 17, further comprising a hood disposed over the process chamber, the hood being movable between an open position and a closed position and adapted to permit removal and insertion of the process pan.

- [c19] The system of claim 17, further comprising a heat recovery unit operatively connected to the outlet of the process chamber and adapted to recover heat from air containing the vaporized hydrocarbons and other contaminants.
- [c20] The system of claim 17, further comprising at least one filter adapted to remove particulate matter from the heated air disposed between the outlet of the process chamber and an inlet of the first condenser.
- [c21] The system of claim 20, wherein the first condenser comprises:
cooling coils adapted to condense the volatilized hydrocarbons so as to form liquefied hydrocarbons;
an oil/water separator coupled to a condenser outlet and adapted to separate the liquid hydrocarbons; and
a condenser outlet adapted to convey liquefied hydrocarbons and contaminants to the oil/water separator.
- [c22] The system of claim 21, further comprising:
a second condenser operatively connected to the first condenser; and
a blower disposed between the second condenser and the first condenser.
- [c23] The system of claim 17, further comprising a control valve operatively connected to the first condenser, the control valve adapted to release excess pressure in the first condenser through a thermal oxidizer.
- [c24] The system of claim 23, wherein the control valve comprises at least one selected from the group consisting of a control meter, a pressure transducer, and a pressure relief valve.
- [c25] The system of claim 17, further comprising a control valve operatively connected to a sensor adapted to detect non-condensable gases, the control valve adapted to release non-condensable gases through a thermal oxidizer.